

Barbara  
Do we have a file of these -  
if not maybe you could  
keep them in a book  
JST

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Geothermal Energy

May 1980

COORDINATION OF GEOTHERMAL RESEARCH

Alan M. Jessop

Internal Report 80 - 4

Geothermal Service of Canada  
Division of Seismology and Geothermal Studies  
Earth Physics Branch  
Department of Energy, Mines and Resources  
1980

The Geothermal Coordinator visited Vancouver and Victoria during the week of 26-30 May 1980 in order to consult colleagues on the status of current projects and to attend a meeting with scientific staff of the British Columbia Ministry of Energy, Mines and Petroleum Resources on the subject of regional geothermal energy R&D.

On 26 May the Coordinator visited the offices of Nevin, Sadlier-Brown, Goodbrand Ltd. (NSBG) in Vancouver. Several topics were discussed:

1. The company is preparing a major report on Geothermal Energy in British Columbia, under contract to the Ministry of Energy, Mines and Petroleum Resources (MEMPR), R.L. Evans in particular. This report will include maps of current information and prediction of resource occurrence, reviews of the methods of exploration and production, and analysis of applications and economics. A report on geothermal energy from sedimentary formations of northeastern British Columbia had also been prepared by Reid, Crowther and Partners Ltd. (RCP). This report had been shown in draft form to some members of the geothermal community, but the EMR Coordinator had not seen it. (See notes on meeting with MEMPR, below).

2. NSBG is considering a fish-raising project, using geothermal water as a heat supply. Only very modest temperatures are required, provided that the supply is good, and there are probably many areas where such water could be found. Since this would primarily be a demonstration project and could fit well in the Federal-Provincial Agreement (FPA) system, the coordinator

suggested that NSBG talk to R.L. Evans. A. Nevin agreed, but he thought it advisable to finish the report project first.

3. Mining companies on the Yukon - NWT divide need electrical power. Hot water from deep sedimentary rocks in the Pointed Mountain - Liard River area has been suggested as a possible energy source, probably with 'top-up' by local coal. RCP seem to be keen on this idea, but they are engineers and it was agreed that they show very little knowledge of the earth science aspects. A geological study would be needed first.

4. A proposal to investigate Quaternary volcanic areas near Whitehorse is being prepared by RCP, and contact is to be made with the Yukon Territorial Govt. The coordinator has since spoken to P. Fraser of Dept. of Tourism and Economic Development, he has outlined the sources of advice in earth science within EMR, and he has urged her to consult us.

5. NSBG is interested in the Okanagan area as a geothermal source area. This coincides with current thinking on Tertiary basins in the interior of British Columbia. A. Nevin enquired about the use of lake-bottom heat-flow probes as a way of obtaining relatively cheap data. I explained some of the drawbacks of this approach, and it was agreed that he should consult Trevor Lewis for a possible cooperative field programme when the Bullard probe has finished the activities now planned.

6. The question of legislation governing geothermal resources in British Columbia is being actively discussed within the Provincial government with a

view to creating a new act. A. Nevin sees three key needs: the provision of ability to lease areas for exploration and production, the provision of ability of commercial agencies to generate electrical power, and the definition of the tax status of the resource. Regulations in the United States have provided boundless opportunities for the legal profession. It is hoped that Canadian resources can be developed without similar delays and extra costs.

On 27 May the Coordinator visited J.G. Souther at the offices of the Geological Survey, in order to review the current status of the projects financed by Panel funds. The details are shown in an Appendix to this report. Since that time, a proposal has been received from the University of Waterloo for continued isotope hydrology at Meager Mountain. Since this is still an experimental technique, it has been fitted into the budget. The investigation of the alteration products in the cores from the hot regions of Meager Mountain by Peter Read is revealing excellent evidence of the deposition of minerals, including sphalerite, and this work should yield valuable insights into the genesis of some metallic mineral ores.

On 28 May a meeting was held with earth scientists of MEMPR in Victoria. This meeting is reported separately from the main part of this report, so that it can be detached and sent to MEMPR. During the evening the coordinator worked with J.F. Lewis to review the paper 'Heat flow in the Garibaldi Volcanic Belt, a possible Canadian Geothermal Energy resource area', in response to comments by referees. The revised version will be returned to the journal shortly.

On 29 May the Coordinator, in company with T.J. Lewis, visited the Dept. of Geology of the University of British Columbia to meet three students engaged in some aspect of geothermal research.

1. Jane Leroux is working on the contract to UBC for geological and radiometric mapping of the Coryell intrusives near our drill sites of 1978 (item 1.1). After a somewhat disappointing start in 1979, particularly in the radiometric mapping, she seems to have benefitted from discussions during the winter.
2. Randy Parrish is working on thermal modelling of the Coast Plutonic Complex. This project is not financially supported by EMR, but he hopes to use our divided bar at PGC to make some conductivity measurements, and we are taking steps to have this set up by late summer.
3. Gordon Jamieson is working on the hydrological modelling of Meager Mountain. This project is receiving only low level financial support from EMR, as part of item 1.7, but information and advice is being made available.

Notes on meeting between MEMPR and EMR  
on geothermal energy R&D

A meeting was held at the offices of MEMPR in Victoria on 28th May 1980, to discuss geothermal energy R&D. Present were J. Fyles (Senior Assistant Deputy Minister), W. Young (Chief Petroleum Geologist), A. Sutherland-Brown (Chief Geologist, Geological Div., Mineral Resources Branch), E. Grove, and N. Church, all of MEMPR, and W. Milne, T. Lewis, J. Souther and A. Jessop of E.M.R.

The purpose of the meeting was to exchange information on R&D programmes relevant to geothermal energy and to discuss ways of cooperating in this work. Activities at Meager Mountain under the Federal-Provincial Agreement, leading to a demonstration project by the British Columbia Hydro and Power Authority were not included in the discussion.

A. Jessop began by outlining the three funding sources within EMR: the Federal-Provincial system, the Panel funds and the continuing A-base. He went on to present the list of activities financed by Panel funds. This list is prepared each year, by a meeting of EMR scientists, usually in Vancouver, in December or January before the beginning of the year in April. It is shown here in an Appendix.

The most promising area for cooperation at present is the drilling of holes for temperature gradient measurement, activity 1.3. T. Lewis and N. Church had already discussed this and at a previous meeting, involving J. Fyles and M. Berry of EMR had discussed the advisability of deepening holes left by the mining industry or uranium prospects. For reasons of public relations it

had been decided to avoid using any such holes. The question of a seismic line to examine the structure of the White Lake Basin was raised. It was considered that an adequate line would cost as much as the drilling project, and that successful results were by no means assured because of the complex layering of the rocks in the basin.

J. Souther reviewed his work on Mount Cayley, including detailed mapping and the location of four new warm springs in 1979. The GSC also is studying slope stability in the area, since successive air-photo surveys show evidence of major slides.

It was agreed that the two groups would keep in close contact and would cooperate where possible. The EMR group undertook to present their list of activities next year as soon as it was drawn up.

The MEMPR representatives discussed briefly the possibility of allocating Provincial funds to geothermal energy R&D. They asked if this would induce EMR to stop their work. The EMR representatives present thought that this would be an encouragement rather than a reason to stop, but political decisions could be different.

The report by Reid, Crowther and Partners Ltd. was mentioned and J. Fyles loaned a copy of the draft version to A. Jessop.

Appendix

Present status of projects involving Panel funds, with person responsible and estimated costs in units of \$1000.

1. Delineation of Regional Geothermal anomalies.
- 1.1 Geological and radiometric mapping of Coryell intrusives. J.G. Souther  
Contract to UBC let, and student is preparing 12  
for field activities.
- 1.2 Potassium - Argon dating of volcanic centres. J.G. Souther  
Contract let to UBC 7
- 1.3 Drilling of young intrusive rocks, in an area of T.J. Lewis  
anticipated high temperature gradient. 70  
Discussions between T.J. Lewis (EMR) and N. Church  
(MEMPR) are continuing. Sites will be determined  
shortly.
- 1.4 Resistivity survey at Cayley Mountain, a single line J.G. Souther  
reconnaissance survey along the line of Shovelnose  
Creek. In the tendering process at DSS. 25
- 1.5 Drilling on the volcanic axis between Cayley and Meager J.G. Souther  
Mountains to investigate the thermal regime relative 35  
to previous background information. Site chosen.
- 1.6 Pipe to preserve holes in areas of suspected high T.J. Lewis  
temperature gradient, with transportation and 10  
installation costs. No opportunities arising  
so far.
- 1.7 Water and rock sampling as need and opportunity arises. J.G. Souther  
Funds partially committed. 5



1.8	Monitoring of temperatures during drilling projects 1.3 and 1.5. See 1.11.	T.J. Lewis
1.9	Preliminary study of Monterey Hills. Low priority item, subject to progress of geophysical surveys now being planned elsewhere. Probably will not be done in 1980-81.	M.J. Drury 0
1.10	Preliminary study of Maritimes intrusives. After consultations with the Provincial governments a contract will be initiated shortly.	M.J. Drury 20
1.11	Mercury survey in the Anaheim Volcanic Belt. This item has been combined with 1.8 and 2.5 in one contract, the various parts to be monitored by the appropriate EMR personnel. Contract let and work in progress.	J.G. Souther 20
1.12	Shallow seismic experiment at Mount Cayley, to confirm suitability of drill site. In contracting process.	J.G. Souther 1.5
Total - Project 1		205.5
2.	Identification and assessment of geothermal resources.	
2.1	Alteration studies of core from Meager Mountain and other drilling. Contract let for 1980 work, estimated cost increased.	J.G. Souther 15
2.2	Magneto-magnetic resistivity survey at Meager Creek. at sites occupied by magneto-telluric survey. Work in progress.	L.K. Law 15
2.3	Literature study of seismic monitoring for reservoir activity, to be extended to survey if appropriate. Completed. No further action to be taken.	G.C. Rogers 0

2.4	Thermal conductivity of rock cores from various drill sites. Contract let.	T.J. Lewis 2
2.5	Magnetic survey in the vicinity of Meager Mountain. See item 1-11.	L.K. Law
2.6	Isotope hydrology at Meager Mountain. Unsolicited proposal received from University of Waterloo, in process of contracting.	J.G. Souther 7
Total - Project 2		39
3.1	Temperature logging of Regina well and second well if drilled. Waiting for decision on second well.	A.M. Jessop 10
3.2	Acquisition of net-rock analyses. Requisition for contract submitted.	A.M. Jessop 40
3.3	Investigation of temperature anomalies subject to opportunity. No opportunities arising so far.	A.M. Jessop 15
3.4	Feasibility study of geothermal potential in N.E. British Columbia. Held in order to study results of MEMPR contract.	A.M. Jessop 20
Total - Project 3		85

<u>Summary</u>	\$K
1. Regional geothermal anomalies	205.5
2. Identification and assessment of resources	39
3. Sedimentary basins	85
D.S.S. charges, 6% of contracts	18
Travel and operating expenses	<u>15</u>
Total	362.5
Funds available	360

It is anticipated that the small difference in the totals will be adjusted to zero as refinements in the costs become available. It is essential that all activity supervisors continue to let me know changes in expected costs as soon as possible.